



GRC Microgravity Science Program
Fluids and Combustion Facility



FIR Provided PI Resources/Services



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FIR Resources/Services Tables

The purpose of these tables is to provide PI teams, who are pre-RDR, with the necessary information to determine if their hardware concepts fit within the resources and capabilities of the FIR. The numbers in these tables should be used for early planning purposes only. More accurate numbers will be developed in the Integration Agreement and Interface Control Document between the FCF and the PI teams. The draft versions of these documents should be completed for PDR and the final versions should be signed in the CDR time frame.

FIR ISS Requested Resources Table

- The numbers listed in this table reflect the resource allocation requested to ISS in the Payload Integration Agreement between FCF and ISS. This is only a request. The actual resources will be allocated on an increment to increment basis.
- The requested resources shown are per year. As a first cut the resources should be divided among the PI's in a given year based on the up/down flow in the GRC traffic model.
- All the resources, except the stowage volume, have to be divided between the PI's for the year. Stowage must be split among the PI's on orbit at any given time (see the GRC traffic model).

FIR Services Table

- Air thermal, power, volume and mass for FIR diagnostics must be accounted for in the PI allocation. Values for the FIR diagnostics are listed at the bottom of the sheet.
- Crew time required to reconfigure FIR (i.e. remove FIR diagnostics to increase available mass for the PI HW) is book kept against the PI.



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FIR ISS Requested Resources ³				
Resource	Total/yr	FIR/yr	PI/yr ^{1,2}	Comments
On-Orbit Stowage (m ³)	1	0.4	0.6	Stowage must be split among the PIs on orbit at any given time (see the GRC traffic model). Included in the PI volume is stowage for data storage media; includes a 30% packing factor. It is assumed that mini-facilities are installed directly into the FIR.
Up Mass (kg)	750	150	600	Included in the PI mass is the mass for data storage media
Down Mass (kg)	750	150	600	Included in the PI mass is the mass for data storage media
Up Volume (m ³)	1.6	0.2	1.4	Included in the PI volume is the volume for data storage media; includes 30% packing factor.
Down Volume (m ³)	1.6	0.2	1.4	Included in the PI volume is the volume for data storage media; includes 30% packing factor.
Energy (kWH)	3200			Based on 2000 hr of operation. The avg. FIR power requirement is 1kW; The actual FIR/PI's energy split depends on the actual power draw for each and on the operating time.
Crewtime (hr.s)	180	25	155	Crew time required for facility and PI hardware setup, experiment execution, and tear down are charged to the PI.
Downlink (terabits)	41.1	0.1	41	PI downlink includes digital & video data (approximately 50-50 split).
Uplink (terabits)	1.72x10 ⁽⁻⁴⁾			
Late/early access	Yes			
Notes				
1. Resources are per year therefore PI resources must be divided among the PIs scheduled to be in the facility in a given year (except for on-orbit stowage).				
2. Mini Facility Resources are charged against the PI allocation				
3. Resource data from A. Sexton Email (3/00) to John Temple and FCF Resource Estimate White paper by T. O'Malley (4/00)				



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		FIR Services			
Service		PI		Comments	
Thermal/Air ¹ (kW)		0.7 max		PI must include the FIR diagnostics heat load against the PI allocation. (cameras, light sources, DCM's) See chart below to estimate FIR Load Under 400W, max air temperature 30C.	
Thermal/Water ² (kW)		3		Ti = 18C(65F), To = 38C(100F); Max operating water flow rate 135kg/hr (300lb/hr) @ a DeltaP of 6.5 PSID; 0.1lbm/hr/W; The waterflow rate is regulated so it exits at 38C.	
Power ^{1,2,3} (kW)		3.2		The power is provided by six 28V 4A circuits, three 120V 4A circuits and ten 28V 4A circuits. The ten 28V circuits are for the FIR provided diagnostic equipment - these connectors include data and control lines (PIs can use these circuits for other uses if not required for the FIR diagnostics). FIR diagnostics used by the PI is book kept against the PI's available power (cameras, light sources, DCM's) <u>See chart below to estimate FIR power</u> .	
PI working volume ² (cm)		85w x 120h x 49d		Use of FIR diagnostics such as cameras, DCM's and certain light sources must be placed in the PI volume. <u>Mounting dimensions 74cm x 102cm (wxh) - Recessed electrical, data and control connectors lie outside the mounting dimensions</u>	
PI on-orbit mass (kg) in FIR ⁴		98.9		The total PI mass assumes that the PI is not using any of the FIR diagnostics (cameras, light sources, DCM's, . . .) See chart below to estimate available PI mass => subtract FIR diagnostics mass from the PI total . Crew time to remove FIR HW is book kept against the PI.	
GN ₂ ² (kg/hr)		5.4		Delivery pressure 517 to 827 kPa; Delivery temperature 15.5 to 45C. Total GN2 mass is limited - quantities will have to be worked with ISS.	
Vacuum Exhaust ² (torr-liter/sec)		1.20E-03			
Microgravity		TBD			
Acoustic		TBD			
References					
1. J. Siamidis ECS WTCS Presentation 3/27/00 and from L. Noble FIR PI Working Volume Thermal Issues 3/21/00					
2. FIRBCD 10/99					
3. FIRPower Profile FIR-DOC-0090, 11/99					
4. Mass Properties ReportFIR-RPT-088, 10/99					
Component		Watts (Air) *	Mass (Kg) **	LxWxD (cm)	
Analog DCM		50	TBD	TBD	
Color Camera		50	5.4	TBD	
Color Lens		TBD	0.7	TBD	
DCM		50	2.2	TBD	
Diode Laser		TBD			
Door Fans		40			
Hi Mag Lens		TBD	1.3	TBD	
Hi Res Camera		100	4.8	TBD	
Hi Speed Camera		TBD	TBD	TBD	
LED Array		140	4.5	TBD	
NdYAG Laser		40			
Scanning Mirror		TBD	5.6	TBD	
Translation Stage		TBD	5.3	TBD	
White light		90	4.1	TBD	
* Power values from FIRPower Profile FIR-DOC-0090 11/99 and from J. Siamidis ECS WTCS Presentation 3/27/00					
** Control Mass values from FIRMass Properties Status Report No.1 (FIR-Plan-088-1)					